CLAIMS

1. A fuel cell system wherein system components are arranged to facilitate the transfer of heat from those components which generate heat in operation to those which cool in operation.

2. A system according to claim 1, comprising a fuel cell stack, control electronics and a hydrogen canister, the stack and/or control electronics being arranged so that heat generated in use is capable of warming the hydrogen canister as it cools on release of hydrogen.

3. A system according to claim 1, comprising a fuel cell stack and a mounting for a fuel canister, said mounting being arranged such that, in use, heat from the fuel cell stack is transferred to a said fuel canister mounted to said mounting.

4. A system according to claim 3, further comprising a casing and a mounting for said fuel stack, said mounting for a fuel canister being disposed above said mounting for said fuel stack in said casing whereby, in use, heat from said fuel stack rises to heat a said fuel canister mounted in the casing.

5. A system according to claim 4, wherein said mountings include a frame, said frame carrying electrical components of said system and the arrangement being such that, in use, heat from said fuel cell stack and electrical components rises to heat a said fuel canister mounted in the casing.

6. A system according to claim 4 or 5, further comprising at least one air flow directing element in said casing arranged such that, in use, said heat rises by heating air surrounding said fuel cell stack which heat air is directed towards a said fuel canister mounted in the casing by said at least one

air flow directing element.

7. A fuel cell system comprising a portable casing, a fuel cell stack mounted in said casing, a mounting for a fuel canister in said casing and a mounting for electrical components in said casing, the arrangement being arranged such that said fuel cell, electrical components and a fuel canister mounted to said fuel canister mounting are in stacked relationship, whereby, in use, heat from said electrical components and fuel stack can rise to heat said fuel canister.

8. A fuel cell system comprising a connector coupled to a fuel line, and means for guiding a fuel canister into coupling engagement with the connector.

9. A system according to claim 8, comprising means operable to disengage the canister from the connector.

10. A fuel cell system comprising a fuel supply line connected with a fuel cell stack having a connector at an end thereof for connecting with a connector of a fuel canister and a guide arrangement for guiding a said fuel canister to a mounted position at which said connector of the fuel canister connector connects with said connector of the fuel supply line.

11. A system according to claim 10, wherein said connectors are push-fit connectors that permit release of a connection therebetween by movement of the connector of the fuel canister toward the connector of the fuel supply line, the system further comprising a device for moving said connector of the fuel canister toward the connector of the fuel supply line.

12. A system according to claim 11, wherein said device comprises a rotatable cam member.

13. A fuel canister for use with a fuel cell system, the canister comprising means operable to record data relating to the amount of fuel in the canister.

14. A fuel cell system for use with the canister of claim 5, the system comprising means operable to estimate (at least approximately) the quantity of fuel in a canister, and means operable to write to the canister data pertaining to the estimated quantity of fuel in the canister.

15. A method for estimating the amount of fuel in a fuel canister of a fuel cell system, the method comprising the steps of: reading data from the canister, said data comprising an indication of the power that may be drawn from a fuel cell system using all the fuel in the canister; monitoring the power consumed by an external appliance when the fuel cell system is in use with that canister; and estimating the amount of fuel remaining in the fuel canister by subtracting the power consumed from the power data read from the canister.

16. A fuel cell system comprising a controller and a data reader, said data reader being operable to read data from a data storage element carried by a fuel canister connected with the system and said controller being operable to monitor power output from the system and determine an indication of the amount of fuel in said fuel canister based on the data read from said storage element and said power output.

17. A system according to claim 16, wherein said data reader is a read/write device and is operable to write data to said storage element to modify the data stored on said storage element.

18. A fuel cell system comprising a fuel cell stack, a hydrogen

supply source for supplying hydrogen fuel to the stack, an arrangement for supplying air to the stack, and a controller that is operable - on start-up of the system - to inhibit the supply of hydrogen until air has been supplied to the stack.

19. A fuel cell system comprising a fuel cell stack, a hydrogen supply source for supplying hydrogen fuel to the stack, an arrangement for supplying air to the stack, and a controller that is operable - on shut-down of the system - to inhibit the supply of hydrogen whilst continuing to supply air to the stack to flush residual hydrogen therefrom before subsequently inhibiting the supply of air to the stack.

20. A fuel cell system in which a controller is operable to monitor a voltage produced by a fuel cell stack after start-up, and to selectively inhibit the supply of electrical power to one or more other electrical components of the system until the voltage produced is sufficient to power said one or more components.

21. A system according to claim 20, wherein the controller is also operable to selectively inhibit the supply of electrical power to one or more of said components in the event of a drop in the voltage produced by the fuel cell stack.

22. A fuel cell system comprising a fuel cell stack, means for mixing to a variable extent oxygen-depleted air output from the stack with air having a greater oxygen content to provide an air mix for input as fuel to the stack, and means for supplying said air mix to the stack.

23. A system according to claim 22, comprising means for measuring the humidity of said air mix.

24. A system according to claim 23, comprising means for automatically varying the ratio of oxygen-depleted air to air of greater oxygen content in said air mix in accordance with said measured humidity.

25. A system according to claim 22, comprising means operable to monitor the voltage output of the fuel cell stack.

26. A system according to claim 25, comprising means for automatically varying the ratio of oxygen-depleted air to air of greater oxygen content in said input air mix, said voltage monitoring means being configured to instruct the varying means to vary the ratio of said air mix with the aim of optimising said output voltage.

27. A fuel cell system comprising a fuel cell stack, apparatus for mixing to a variable extent oxygen-depleted air output from the stack with air having a greater oxygen content to provide an air mix for input as fuel to the stack, and apparatus for supplying said air mix to the stack.

28. A system according to claim 27, further comprising a device for detecting the humidity of said air mix.

29. A system according to claim 28, wherein said mixing apparatus automatically varies the ratio of oxygen-depleted air to air of greater oxygen content in said air mix in accordance with the humidity detected by said humidity detecting device.

30. A system according to claim 27, further comprising a device that monitors the voltage output of the fuel cell stack.

31. A system according to claim 30, wherein said mixing apparatus automatically varies the ratio of oxygen-depleted air to air of

greater oxygen content in said air mix in accordance with said voltage output.

32. A fuel cell system comprising:

a fuel cell stack having an inlet for receiving fuel air and an exhaust outlet for exhaust air;

an air mixer having a first inlet connected with said exhaust outlet, a second inlet for receiving a relatively oxygen-rich air supply and an outlet connected with said fuel cell stack inlet for the supply of said fuel air from said air mixer; and

a controller which monitors at least one operating parameter of the fuel system and causes said air mixer to vary a ratio of exhaust air and relatively oxygen rich air in said fuel air in accordance with said at least one operating parameter.

33. A system according to claim 32, wherein said at least one operating parameter is voltage output of the system, and said controller is connected with a voltage detecting device for detecting said voltage output.

34. A system according to claim 32 or 33, wherein said at least one operating parameter is humidity of said fuel air and said controller is connected with a device for sensing humidity of said fuel air.

35. A fuel cell system comprising a fuel cell stack, apparatus for extracting water from a stream of relatively water-rich oxygen-depleted air output from the stack, and means for facilitating the evaporation of said extracted water.

36. A system according to claim 35, wherein the facilitating means is operable to route said extracted water to one or more relatively hot components of the system.

37. A system according to claim 35, wherein the facilitating means is operable to route said extracted water to one or more fans.

38. A system according to claim 36 and 37, wherein the facilitating means is operable to route said extracted water to one or more relatively hot components of the system and to one or more fans.

39. A fuel cell system comprising a fuel cell stack, means for extracting water from a stream of relatively water-rich oxygen-depleted air output from the stack, and means for facilitating the evaporation of said extracted water.

40. A system according to claim 39, wherein the facilitating means is operable to route said extracted water to one or more relatively hot components of the system.

41. A system according to claim 39, wherein the facilitating means is operable to route said extracted water to one or more fans.

42. A system according to claim 39 and 40, wherein the facilitating means is operable to route said extracted water to one or more relatively hot components of the system and to one or more fans.

43. A fuel cell system comprising a fuel cell stack, a device connected with said stack for receiving exhaust air from said stack and extracting water from said exhaust air and a member connected with said device for receiving said extracted water and facilitating evaporation of the received water.

44. A system according to claim 43, wherein said member comprises a conduit for conducting said received water to a location adjacent

said stack for facilitating evaporation by heat from said stack.

45. A system according to claim 44, wherein said conduit contains a wicking material.

46. A system according to claim 43, wherein said member comprises a conduit arranged to conduct said received water to a location at which it is exposed to an air flow from at least one fan.

47. A system according to claim 46, wherein said conduit contains a wicking material.

48. A fuel cell system comprising:

a fuel stack;

a hydride fuel supply canister connected with said fuel stack and arranged such that, in use, it receives heat from said fuel stack, said hydride fuel canister being provided with a data storage element for storing data concerning the canister;

a data reader for reading data stored on said storage element; and

a controller connected with said data reader, and operable to determine power output by said fuel system, said controller being operable to determine an indication of the amount of fuel contained in said canister based on data read from said storage element and said power output.

49. A fuel cell system comprising:

a fuel stack having an inlet for receiving fuel air and an exhaust outlet for exhaust air;

a hydride fuel supply canister connected with said fuel stack and arranged such that, in use, it receives heat from said fuel stack, said hydride fuel canister being provided with a data storage element for storing data concerning the canister;

a data reader for reading data stored on said storage element;

a controller connected with said data reader, and operable to determine power output by said fuel system, said controller being operable to determine an indication of the amount of fuel contained in said canister based on data read from said storage element and said power output; and

an air mixer having a first inlet connected with said exhaust outlet, a second inlet for receiving a relatively oxygen-rich air supply and an outlet connected with said fuel cell stack inlet for supplying said fuel air from said air mixer, wherein said controller monitors at least one operating parameter of the fuel system and causes said air mixer to vary a ratio of exhaust air and relatively oxygen rich air in said fuel air in accordance with said at least one operating parameter.

50. A fuel system comprising:

a fuel stack having an inlet for receiving fuel air and an exhaust outlet for exhaust air;

a hydride fuel supply canister connected with said fuel stack and arranged such that, in use, it receives heat from said fuel stack, said hydride fuel canister being provided with a data storage element for storing data concerning the canister;

a read/write device for reading data stored on said storage element and writing new data to said storage element;

a controller connected with said read/write device and operable to determine power output by said fuel system, said controller being operable to determine an indication of the amount of fuel contained in said canister based on data read from said storage element by said read/write device and said power output and to write new data to said storage element based on said indication of the amount of fuel contained in said canister; and

an air mixer having a first inlet connected with said exhaust outlet, a second inlet for receiving a relatively oxygen-rich air supply and an outlet connected with said fuel cell stack inlet for supplying said fuel air from said

air mixer, wherein said controller monitors at least one operating parameter of the fuel system and causes said air mixer to vary a ratio of exhaust air and relatively oxygen rich air in said fuel air in accordance with said at least one operating parameter.

51. A fuel system comprising:

a fuel stack having an inlet for receiving fuel air and an exhaust outlet for exhaust air;

a hydride fuel supply canister connected with said fuel stack and arranged such that, in use, it receives heat from said fuel stack, said hydride fuel canister being provided with a data storage element for storing data concerning the canister;

a read/write device for reading data stored on said storage element and writing new data to said storage element;

a controller connected with said read/write device and operable to determine power output by said fuel system, said controller being operable to determine an indication of the amount of fuel contained in said canister based on data read from said storage element by said read/write device and said power output and to write new data to said storage element based on said indication of the amount of fuel contained in said canister;

an air mixer having a first inlet connected with said exhaust outlet, a second inlet for receiving a relatively oxygen-rich air supply and an outlet connected with said fuel cell stack inlet for supplying said fuel air from said air mixer, wherein said controller monitors at least one operating parameter of the fuel system and causes said air mixer to vary a ratio of exhaust air and relatively oxygen rich air in said fuel air in accordance with said at least one operating parameter; and

a humidity detector for detecting the humidity of said fuel air and connected with said controller, wherein said at least one operating parameter includes humidity of said fuel air.